

General Disclaimer

One or more of the Following Statements may affect this Document

- This document has been reproduced from the best copy furnished by the organizational source. It is being released in the interest of making available as much information as possible.
- This document may contain data, which exceeds the sheet parameters. It was furnished in this condition by the organizational source and is the best copy available.
- This document may contain tone-on-tone or color graphs, charts and/or pictures, which have been reproduced in black and white.
- This document is paginated as submitted by the original source.
- Portions of this document are not fully legible due to the historical nature of some of the material. However, it is the best reproduction available from the original submission.

Creating Interactive Graphical Overlays in the Advanced Weather Interactive Processing System Using Shapefiles and DGM Files

Joe H. Barrett III ENSCO, Inc/Applied Meteorology Unit
Richard Lafosse, Doris Hood, and Brian Hoeth
Spaceflight Meteorology Group

Graphical overlays can be created in real-time in the Advanced Weather Interactive Processing System (AWIPS) using shapefiles or Denver AWIPS Risk Reduction and Requirements Evaluation (DARE) Graphics Metafile (DGM) files. This presentation describes how to create graphical overlays on-the-fly for AWIPS, by using two examples of AWIPS applications that were created by the Applied Meteorology Unit (AMU) located at Cape Canaveral Air Force Station (CCAFS), Florida. The first example is the Anvil Threat Corridor Forecast Tool, which produces a shapefile that depicts a graphical threat corridor of the forecast movement of thunderstorm anvil clouds, based on the observed or forecast upper-level winds. This tool is used by the Spaceflight Meteorology Group (SMG) at Johnson Space Center, Texas and 45th Weather Squadron (45 WS) at CCAFS to analyze the threat of natural or space vehicle-triggered lightning over a location. The second example is a launch and landing trajectory tool that produces a DGM file that plots the ground track of space vehicles during launch or landing. The trajectory tool can be used by SMG and the 45 WS forecasters to analyze weather radar imagery along a launch or landing trajectory. The presentation will list the advantages and disadvantages of both file types for creating interactive graphical overlays in future AWIPS applications.

Shapefiles are a popular format used extensively in Geographical Information Systems. They are usually used in AWIPS to depict static map backgrounds. A shapefile stores the geometry and attribute information of spatial features in a dataset (ESRI 1998). Shapefiles can contain point, line, and polygon features. Each shapefile contains a main file, index file, and a dBASE table. The main file contains a record for each spatial feature, which describes the feature with a list of its vertices. The index file contains the offset of each record from the beginning of the main file. The dBASE table contains records for each attribute. Attributes are commonly used to label spatial features. Shapefiles can be viewed, but not created in AWIPS. As a result, either third-party software can be installed on an AWIPS workstation, or new software must be written to create shapefiles in the correct format. To save development time, the AMU decided to use a third-party software package, the Shapefile C Library V1.2 (<http://shapelib.maptools.org>).

The DGM file format is not as well-known and was created specifically for AWIPS. DGM files are binary files, containing a series of commands stored in two byte integers (GSD 2006). Unknown or incorrectly formatted commands are ignored by AWIPS. There are three drawing commands and the rest are state commands that stay in effect until they are changed. There is one state command that cannot be used in AWIPS - the command to set the drawing color. The color of AWIPS graphical overlays can only be manually changed by the user with the AWIPS D2D application. Each DGM command is represented by a unique "opcode" in hexadecimal format. Absolute coordinates normally are in minutes of latitude or longitude; east and south are positive. For example, 30 degrees north latitude is encoded as "-1800" (-60*30), and 80 degrees west longitude is encoded as "-4800" (-60*80). The most useful commands are:

- Draw Linked Vectors,
- Draw Unlinked Vectors,
- Draw Text,
- Set Text Centering,
- Set Text Orientation,
- Select Absolute Addressing,
- Select Relative Addressing, and
- Set Frame Size.

References

ESRI. *ESRI Shapefile Technical Description*, July 1998.
<http://www.esri.com/library/whitepapers/pdfs/shapefile.pdf>. Accessed March 7, 2007.

NOAA Earth System Research Laboratory, Global System Division. *DARE Graphics Metafile (DGM) Instruction Format*, 2006. Unpublished.

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.					
1. REPORT DATE (DD-MM-YYYY) 14-05-2007		2. REPORT TYPE Abstract		3. DATES COVERED (From - To) Apr 2006 - Apr 2007	
4. TITLE AND SUBTITLE Creating Interactive Graphical Overlays in the Advanced Weather Interactive Processing System Using Shapefiles and DGM Files				5a. CONTRACT NUMBER NNK06MA70C	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Joe H. Barrett III Richard Lafosse Doris Hood Brian Hoeth				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) ENSCO, Inc. 1980 N. Atlantic Ave. Suite 230 Cocoa Beach, FL 32931				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) NASA John F. Kennedy Space Center Code KT-C-H Kennedy Space Center, FL 32899				10. SPONSORING/MONITOR'S ACRONYM(S)	
				11. SPONSORING/MONITORING REPORT NUMBER	
12. DISTRIBUTION/AVAILABILITY STATEMENT Unclassified, Unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT Graphical overlays can be created in real-time in the Advanced Weather Interactive Processing System (AWIPS) using shapefiles or DARE Graphics Metafile (DGM) files. This presentation describes how to create graphical overlays on-the-fly for AWIPS, by using two examples of AWIPS applications that were created by the Applied Meteorology Unit (AMU). The first example is the Anvil Threat Corridor Forecast Tool, which produces a shapefile that depicts a graphical threat corridor of the forecast movement of thunderstorm anvil clouds, based on the observed or forecast upper-level winds. This tool is used by the Spaceflight Meteorology Group (SMG) and 45th Weather Squadron (45 WS) to analyze the threat of natural or space vehicle-triggered lightning over a location. The second example is a launch and landing trajectory tool that produces a DGM file that plots the ground track of space vehicles during launch or landing. The trajectory tool can be used by SMG and the 45 WS forecasters to analyze weather radar imagery along a launch or landing trajectory. Advantages and disadvantages of both file types will be listed.					
15. SUBJECT TERMS Advanced Weather Interactive Processing System (AWIPS), Shapefiles, thunderstorm anvil clouds					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 1	19a. NAME OF RESPONSIBLE PERSON Dr. Francis J. Merceret
a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. TELEPHONE NUMBER (Include area code) (321) 867-0818
	U	U			